

What is claimed is:

1. An improved apparatus for collecting, transmitting, and processing data stored in a code such as a bar code, said apparatus including a portable code reader with processing and transmitting units for radiating information in the form of electromagnetic waves, a stationary receiver physically separate from the code reader, and a data processor coupled to the stationary receiver, wherein the improvement comprises:
 - 10 a network controller member having a multiplicity of communication ports thereon, said network controller member intercommunicative with said data processor at one of said communication ports;
 - 15 said network controller member intercommunicative with said stationary receiver at another of said communication ports; and
 - said network controller member selectively operable with said data processor at one or more
 - 20 communication rates.
2. The apparatus of claim 1 wherein, at least one of said communication ports selectively controllable to provide data interchange by a V.35 interface.
3. The apparatus of claim 1 wherein, said at least two communication ports are selectively controllable to provide data interchange by a RS485 interface.
4. The apparatus of claim 1 wherein more than one host computer may be interconnected to said data communication system.

5. The apparatus of claim 1 wherein,
a number of said multiplicity of communication
ports are dedicated to interconnection to host
computers and the remainder of said communicative
5 parts are interconnectable with base transceiver
units.

6. In a data communication system having a
plurality of mobile transceiver units communicative
with a plurality of base transceiver units,
a network controller intercommunicative between
5 the base transceiver units and one or more host
computers for data interchange therebetween.

7. A data communication system having a
plurality of mobile transceiver units selectively
communicative with a plurality of base transceiver
units, comprising:
5 a network controller intercommunicative between
the base transceiver units and one or more host
computers for data interchange therebetween;
an adapter coupled to the network controller
and intercommunicative between said controller and
10 said plurality of base transceiver units; and
said adapter providing coupling between said
network controller and said base transceiver units
simultaneously.

8. A radio frequency data communication
system for transmission of data collected by a
multiplicity of remote terminals to one or more base
stations, comprising:
5 the multiplicity of remote terminals
selectively communicative with said one or more base
stations, each of said remote terminals selectively
operable in response to transmission from one of
said base stations; and

10 each of said remote terminals independently
 cycling from a dormant status to an active status
 over predetermined time intervals when no
 transmission from a base station is directed to such
 remote terminal.

 9. A radio frequency data communication
 system for transmission of data collected by a
 multiplicity of roaming terminals each having a
 radio transmitter to one or more base stations,
5 comprising:

 the multiplicity of roaming terminals
 selectively communicative with said one or more base
 stations, each of said roaming terminals selectively
 operable in response to transmission from one of
10 said base stations; and

 each of said roaming terminals maintaining the
 radio transceiver energized by battery power for a
 selected time interval, and after such selected time
 interval or after completion of a transmission
15 occurring within such time interval, periodically
 turning the radio transceiver off for substantial
 time intervals to conserve battery power.

 10. In a data communication system having a
 host computer, a plurality of intermediate bridging
 stations, and a plurality of mobile transceiver
 units, all communicative with a base station, a
5 local area network comprising:

 said plurality of intermediate bridging
 stations organized into an optimal spanning tree
 with said base station at the root.

 11. The local area network of claim 10
 wherein:

 said local area network is capable of routing
 information between said host computer, said

5 intermediate bridges, said mobile transceivers, and
said base transceiver units using RF signals.

12. The local area network of claim 10
wherein:

said optimal spanning tree is created and
maintained using a backward learning technique.

13. The local area network of claim 11
wherein:

said RF signals incorporate spread spectrum
technology.

14. A method of routing information in a data
communication system having a host computer, a
plurality of intermediate bridges, and a plurality
of mobile transceiver units, all communicative with
5 a base station, comprising the following steps:

organizing said data communication system into
an optimal spanning tree with said base station at
the root.

15. The method of claim 14 wherein:

said step of organizing said data communication
system into an optimal spanning tree is achieved by
said intermediate bridges attaching to nodes
5 logically closest to the root node.

16. The method of claim 15 wherein:

said attached bridges use a backward learning
technique to learn the correct path to route data
communication between said host computer and said
5 mobile transceiver units.

17. A method of routing information in a data
communication system having a host computer, a
plurality of intermediate bridges, and a plurality

5 of mobile transceiver units, all communicative with
a base station, comprising the following steps:

(a) organizing said data communication system
into an optimal spanning tree with said base
station at the root; and

10 (b) said step of organizing further comprising
the step of said attached bridges using a backward
learning technique to learn the correct path to
route data communication between said host computer
and said mobile transceiver units.

18. A method of beginning a data exchange over
and RF communication link between a polling device
and a sending device wherein the polling device has
an interpoll gap time, comprising the steps of:

5 (a) identifying by the sending device that the
RF communication link is clear throughout a period
which is at least as long as the maximum possible
interpoll gap time; and

10 (b) transmitting a request for poll frame by
the sending device.

19. A method used by a remote terminal having
an RF range for selectively attaching itself to one
of a plurality of RF base stations each of which has
an associated cost, a preset priority and a preset
5 number, comprising the steps of:

(a) receiving by the remote terminal messages
indicative of the signal strength of each of the
base stations within RF range;

10 (b) discarding all messages with signal
strengths below a predetermined minimum threshold
level; and

15 (c) attaching itself to one of the plurality
base station based on the cost, the signal strength
of the messages, the preset priority and the preset
number.

20. A method for selecting and redundantly replacing a root device when it breaks down from among a plurality of potentially root devices, each of said potential root device having a single,
5 assigned preset number, comprising the steps of:

initially selecting the potential root device by identifying the lowest assigned preset number of the plurality of potential root devices; and

10 repeating said step of selecting without considering the preset number of the current selected root device, whenever the currently selected root device breaks down.

21. A method used by a remote terminal for gathering and transmitting data to one or more base stations, said method comprising the steps of:

5 when not gathering data, operating at a lower system clock rate so as to minimize digital noise in transmission to and reception from one or more of the base stations; and

when gathering data, operating at a higher system clock rate to increase data input.

22. A method used by a base station having both a non-directional and a programmable, directional antenna system in a radio frequency communication system having a plurality of base
5 stations and roaming terminals, said method comprising the steps of:

(a) transmitting using a non-directional antenna system when communicating with one of a plurality of roaming terminals; and

10 (b) programmably adjusting the transmission power and direction of a directional antenna system and transmitting using the directional antenna system when communicating with another of the plurality of base stations.

23. In a data communication system having a plurality of mobile transceiver units communicative with a plurality of base transceiver units,

5 a network controller intercommunicative between the base transceiver units and one or more host computers for data interchange therebetween, and having port means providing interface at a relatively low data rate and at a relatively high data rate.

24. The network controller of claim 23 wherein said controller includes means for interconnection of existing installed mobile transceiver units therewith.

25. The network controller of claim 24 wherein said controller communicates with said base transceiver units by an RS232C interface.

26. The network controller of claim 23 wherein said network controller providing a multiplicity of data communication ports thereon, at least two of said communication ports being
5 software-controllable to select among a plurality of interface means.

27. The invention of claim 26 wherein at least one of said communication ports being communicative with a network of serially interconnected base transceiver units over a single
5 twisted pair.

28. The invention of claim 23 wherein at least a portion of said mobile transceiver units are communicative with said base transceiver units by spread spectrum means.

29. The invention of claim 23 wherein
at least a portion of said mobile transceiver
units are communicative with said base transceiver
units by synthesized frequency radio means.

30. The invention of claim 27 wherein
said network of base transceiver units is
operable over an RS485 interface.

31. The invention of claim 23 wherein
said network controller providing a
multiplicity of data communication ports thereon,
at least three of said communication ports
5 being software-controllable to select among a
plurality of interface means,
at least two of said at least three
communication ports being selectively controllable
to communicate by RS232, RS422, RS485, and V.35
10 means.

32. An improved apparatus for collecting,
transmitting, and processing data stored in a code
such as a bar code, said apparatus including a
portable code reader with processing and
5 transmitting units for radiating information in the
form of electromagnetic waves, a stationary receiver
physically separated from the code reader, and a
data processor coupled to the stationary receiver,
wherein the improvement comprises:

10 a network controller member having a
multiplicity of communication ports thereon;

said network controller member
intercommunicative with said data processor at one
of said communication ports;

15 said network controller member
intercommunicative with said stationary receiver at
another of said communication ports; and

20 said network controller member selectively
operable with said data processor at one or more
communication rates.

33. The invention of claim 32 wherein
 said network controller member selectively
operable with said stationary receiver at one or
more communication rates.

34. The invention of claim 32 wherein
 said network controller selectively
intercommunicative with a diagnostic device over one
of said communication ports.

35. The invention of claim 32 wherein
 a second data processor associated with said
network controller and intercommunicative therewith.

36. The invention of claim 32 wherein
 a multiplicity of stationary receivers
intercommunicative with said network controller.

37. The invention of claim 32 wherein
 said network controller selectively operable to
communicate with said data processor at more than
one data transfer rate.